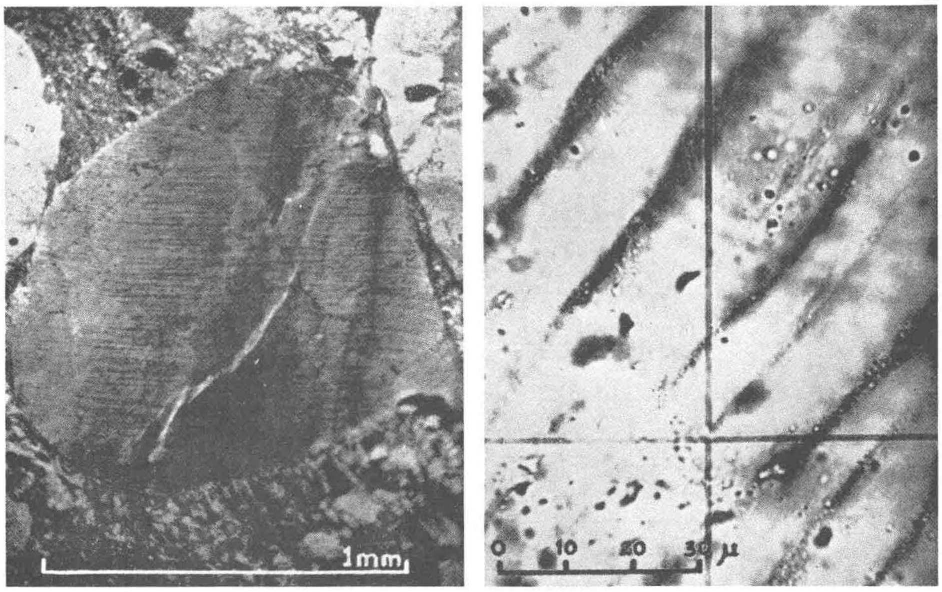

Fig. 42—Photomicrographs of quartz deformation lamellae in grains of Oriskany sandstone (from Hansen and Borg, Ref. 120, Plate 1). On the left is a grain with well-developed lamellae subnormal to zones of undulatory extinction. Crossed Nicols. On the right are lamellae at high magnification inclined at 75 to 80 degrees to the plane of the paper. Crossed Nicols.

Those corresponding to the major concentrations intersect at 60 to 76 degrees in lines parallel to the fold axis. The small circle girdle is best developed in specimen E2, in which the calcite extension axes also fall in a girdle. The acute bisector between the two major sets of deformation lamellae is within 10 degrees of the position of the corresponding derived σ_1 from the twinned calcite; the obtuse bisector also agrees with σ_3 from the calcite. This supports the conclusions that the deformation lamellae form in planes of high shear stress at less than 45 degrees to σ_1 and so are the significant dynamic criteria.

A different view of the dynamic interpretation of quartz deformation lamellae is presented by Christie and Raleigh.[140] They

> showed that the poles of lamellae in four quartzite specimens are distributed along small circles containing maxima. Three of these rocks are from a metamorphic terrain with a complex tectonic history, in which two major deformations are recognizable [Christie, personal communication]. The axes of the small-circles (A_1 in Fig. 46) are almost parallel in the three specimens and are interpreted as the axes of maximum principal (compressive) stress in the deformation

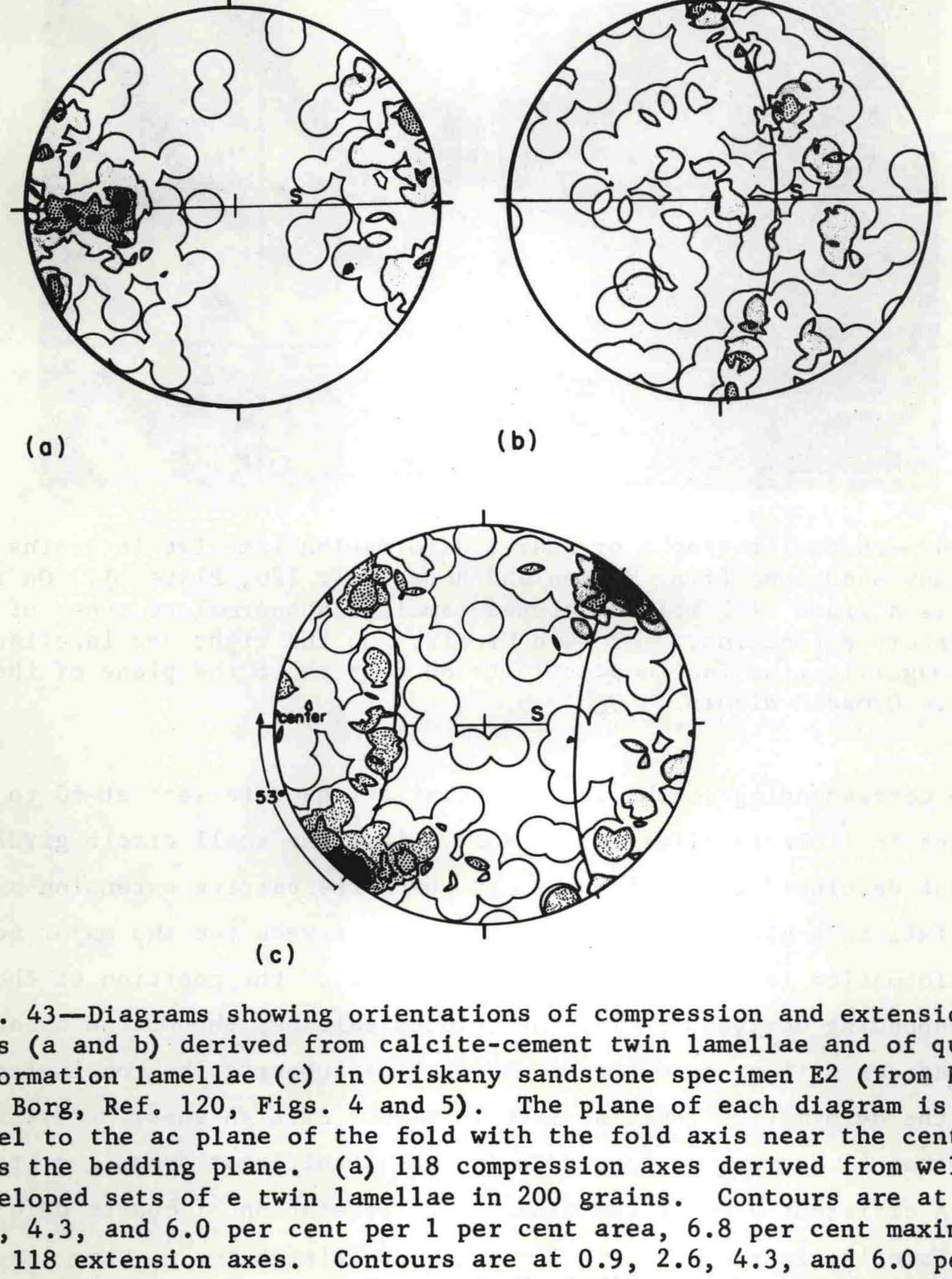

Fig. 43—Diagrams showing orientations of compression and extension axes (a and b) derived from calcite-cement twin lamellae and of quartz deformation lamellae (c) in Oriskany sandstone specimen E2 (from Hansen and Borg, Ref. 120, Figs. 4 and 5). The plane of each diagram is parallel to the ac plane of the fold with the fold axis near the center; s is the bedding plane. (a) 118 compression axes derived from well-developed sets of e twin lamellae in 200 grains. Contours are at 0.9, 2.6, 4.3, and 6.0 per cent per 1 per cent area, 6.8 per cent maximum. (b) 118 extension axes. Contours are at 0.9, 2.6, 4.3, and 6.0 per cent per 1 per cent area. Great circle indicates the trend of the plane containing the extension axes. (c) Normals to 147 deformation lamellae in 400 grains. Contours are at 0.7, 2.1, 3.5, 4.9, and 6.3 per cent per 1 per cent area, 8.4 per cent maximum. The center of the small circle defined by the normals to the lamellae is marked by a dot.